14. HIGH TEMPERATURE EFFECT OF THE POLLEN GRAINS OF BUXUS SEMPERVIRENS L.

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Abstract

Fresh and heated pollen grains at 200 °C during 1 hour, 5, 10, 25, 50, 100, 200 and 300 hours of *Buxus sempervirens* were investigated with the LM method. The qualitative and quantitative results are presented in this contribution.

Key words: Palynology, recent, *Buxus*, high temperature effect.

Introduction

Our experimental studies on the morphological alterations in consequence of high temperature started in 1989 (KEDVES and KINCSEK) on *Amentiflorae* pollen grains. Important alterations were described at the triaperturate pollen grains (*Corylus* and *Betula*) but no important qualitative alterations were established at the polyporate pollen grains of the genus *Juglans*.

Pollen grains of *Buxus* type occur in the Tertiary spore-pollen assemblages (KRUTZSCH, 1966, POTONIÉ, 1970). Concerning the pollen morphology of the *Buxaceae* there are a number of publications. ERDTMAN (1952) published the following: p. 86: "Pollen grains usually polyforate (diameter about 30-45μ)". "*B. sempervirens* (leg. Osbeck, May 1970): 30μ (sexine possibly provided with vestigial spinules)." VAN CAMPO (1967) pointed out the following: p. 65: "Spheroid pollen grains are considered successiform when the number and the disposition of the apertures vary according to a geometrical succession: the colpi issued from the apex of a same equilateral triangle project in plane on segments with angles of 120°. In the periporate grains, the same law leads to a quincunx order of the pores." KÖHLER (1980) established the trends of aperture and exine evolution of the Neotropical species of the *Buxus* pollen grains. Taking into consideration that the polyporate pollen grains are important in the fossil spore-pollen assemblages it is important to investigate the high temperature effect experimentally on recent species.

The aim of the present contribution is to add experimental data to the knowledge of the isodiametric polyaperturate pollen grains.

Materials and Methods

Pollen grains for our investigations were collected by Miss Zs. TERBE on the 17.04.1999 in Újszeged. The experiments were carried out in the Cell Biological and Evolutionary Micropaleontological Laboratory of the J.A. University as follows: Fresh pollen grains (T9-P-1). Temperature of heating: 200 °C, length of time and numbers of experiments: 1h, T9-P-2; 5h, T9-P-3; 10h, T9-P-4; 25h T9-P-5; 50h, T9-P-6; 100h, T9-P-7; 200h, T9-P-8; 300h, T9-P-9. The pollen grains were mounted in glycerine-jelly hydrated at 39.6%.

Results

1. Qualitative results (Plate 14.1., figs. 1-8, plate 14.2., figs. 1-24)

According to the previous establishments the fresh pollen grains are spheroidal and polyforate (Plate 14.1., figs. 1-8, plate 14.2., figs. 1,2). Surface is finely reticulate (Plate 14.1., figs. 1,2,4,5,7). In optical section (Plate 14.1., figs. 3,6) columellar infratectal layer and intine (Plate 14.1., fig. 3) are well shown. The protrusion (Plate 14.1., figs. 7,8) and the peculiar lamellar, thickened intine in the apertural area (Plate 14.1., fig. 6) were observed. Concerning the heated pollen grains our results may be summarized as follows: 1. After 1h of heating (Plate 14.2., fig. 3) protrusion of the protoplasm was observed. 2. The amb from 5h until 300h of heating altered; tri-, tetra-, penta- and poly-angular secondary forms appeared. 3. Alterations in the apertural area were also observed. The most important is the colpus-like exoaperture (Plate 14.2., fig. 7).

2. Quantitative results

Time of heating	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0	µm
0			0.5	2.0	2.5	12.5	21.5	**40.0**	16.0	4.0	0.5		0.5	%
1h				1.0	13.0	15.5	20.0	**27.0**	17.0	3.5	2.5	0.5		
5h			4.5	7.5	16.0	**18.0**	**18.0**	13.5	10.0	7.0	4.0	1.5		
10h			2.5	7.5	16.5	18.5	**26.0**	19.0	9.0	0.5	0.5			
25h				9.5	**28.0**	25.5	18.0	15.5	3.5					
50h			3.5	24.5	**34.5**	17.5	10.5	7.0	2.5					
100h	0.5	3.5	**29.5**	26.5	23.5	14.0	2.5							
200h	0.5	13.0	**42.5**	21.5	17.0	5.5								
300h	2.0	15.5	**60.0**	12.0	8.0	2.5								

The maximum value of the diameter of the fresh pollen grains is 40.0% at 37.5 µm. After heating these values vary as follows: 1h: 27.0% at 37.5 µm, 5h: 18.0 at 32.5 and 35.0 µm, 10h: 26.0% at 35.0 µm, 25h: 28.0% at 30.0 µm, 50h: 34.5% at 30.0 µm, 100h: 29.5% at 25.0 µm, 200h: 42.5% at 25.0 µm, 300h: 60.0% at 25.0 µm.

It is worth of mentioning that the maximal values of the diameters of 25 and 50 hours respectively 100, 200, and 300 hours are identical only the percentages increase.

The percentages over 10% regularly diminish.

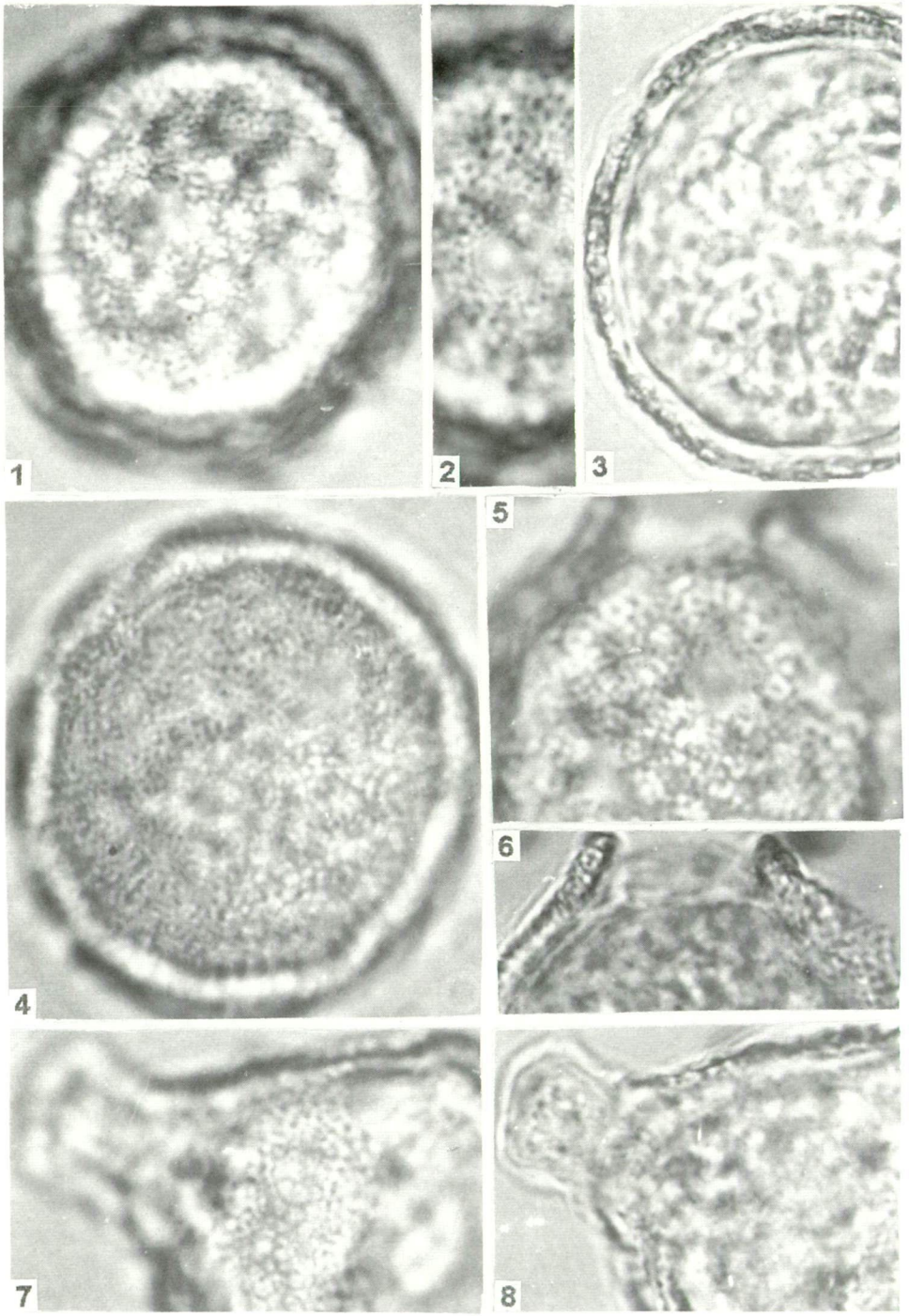

Plate 14.1.

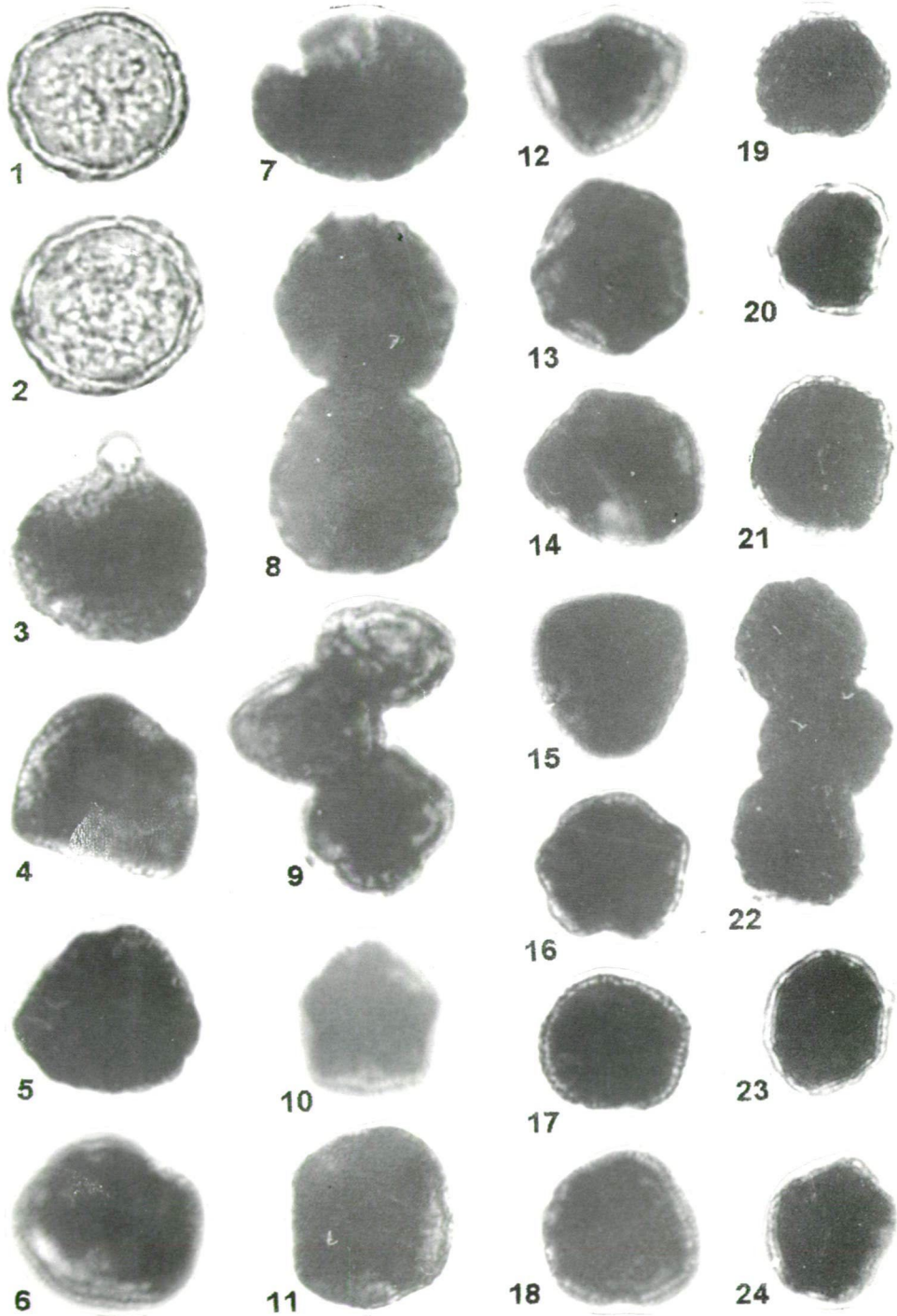

Plate 14.2.

Discussion and Conclusions

Based on our new results we can emphasize the following:

1. The spherical, polyaperturate pollen grains of *Buxus sempervirens* are resistant against high temperature effect, similar to other pollen grains of the same morphological type independently from taxonomical relationships. To this we cite M. VAN CAMPO (1967), p. 65: "Les ensembles polliniques successiformes peuvent se rencontrer dans des familles parfois éloignées les unes des autres, .." But the alteration of the ambitus is different in contrast to the *Juglans* pollen grains. There are some secondary forms similar to the triaperturate pollen grains (Plate 14.2., figs. 5,12,15).

2. WODEHOUSE (1935) pointed out that rounded apertures, for example *Chenopodiaceae* are in really shortened furrows. Our qualitative results support this establishment. Moreover it seems that the earlier forms of the succesiformity appeared polyforate forms - pericolpate, see fig. 7, in Plate 14.2.

Heating, based on our up-to-date experiments resulted in opposite successiform model.

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Plate 14.1.

1-8. Buxus sempervirens L., fresh pollen grains, 2500x.

Plate 14.2.

1-24. Buxus sempervirens L. magnification of all photographs, 1000x.
1,2. Fresh pollen grains, Experiment No: T9-P-1; 3,4. Experiment No: T9-P-2; 5,6. Experiment No: T9-P-3; 7-9. Experiment No: T9-P-4; 10-12. Experiment No: T9-P-5; 13-15. Experiment No: T9-P-6; 16-18. Experiment No: T9-P-7; 19-21. Experiment No: T9-P-8; 22-24. Experiment No: T9-P-9.